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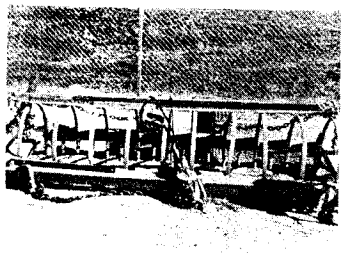

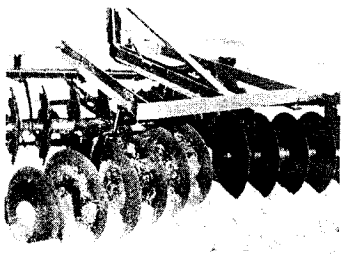

ENVIRONMENTAL LABORATORY

ENVIRONMENTAL IMPACT RESEARCH PROGRAM

TECHNICAL REPORT EL-86-43

LAND IMPRINTERS

Section 8.2.7, US ARMY CORPS OF ENGINEERS WILDLIFE RESOURCES MANAGEMENT MANUAL

by

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Final Report

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An equipment report on land imprinters is provided as Section 8.2.7 of the US Army Corps of Engineers Wildlife Resources Management Manual. The report is designed to assist the Corps District or project biologist with the selection and use of types of equipment and materials available for habitat development and manipulation. Topics covered include description, operation and maintenance, limitations, and availability.

The land imprinter is a seedbed preparation tool that creates a geometric design of depressions in the soil surface. The imprinter basically consists of 2 large drums mounted on a towing frame with angle irons welded to the drum surface. It is most often used to rejuvenate sparse grass stands and improve vegetation establishment on disturbed sites by developing depressions to increase the duration and amount of available moisture. Management objectives for using land imprinters are stated, and benefits to wildlife habitat are discussed. The design and assembly of equipment are described and illustrated, and

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general specifications are provided. Methods of operation are described, and maintenance and safety requirements are given. Appropriate cautions and limitations are discussed.

PREFACE

This work was sponsored by the Office, Chief of Engineers (OCE), US Army, as part of the Environmental Impact Research Program (EIRP), Work Unit 31631, titled Management of Corps Lands for Wildlife Resource Improvement. The Technical Monitors for the study were Dr. John Bushman and Mr. Earl Eiker, OCE, and Mr. Dave Mathis, Water Resources Support Center.

This report was prepared by Mr. Ted B. Doerr, Range Science Department, Colorado State University, Fort Collins, Colo. Mr. Doerr was employed by the Environmental Laboratory (EL), US Army Engineer Waterways Experiment Station (WES), under an Intergovernmental Personnel Act contract with Colorado State University during the period this report was prepared. Mr. Chester O. Martin, Team Leader, Wildlife Resources Team, Wetlands and Terrestrial Habitat Group (WTHG), EL, was principal investigator for the work unit. Mr. Dan W. McKenzie, USDA Forest Service, Equipment Development Center, San Dimas, Calif., and Mr. John Laird, Laird Welding and Manufacturing Works, Merced, Calif., supplied information and photographs used in the report. Review and comments were provided by Mr. Martin, WES, and Mr. Larry E. Marcy, Texas A&M University.

The report was prepared under the general supervision of Dr. Hanley K. Smith, Chief, WTHG, EL; Dr. Conrad J. Kirby, Chief, Environmental Resources Division, EL; and Dr. John Harrison, Chief, EL. Dr. Roger T. Saucier, WES, was Program Manager, EIRP. The report was edited by Ms. Jessica S. Ruff of the WES Information Products Division.

COL Allen F. Grum, USA, was the previous Director of WES. COL Dwayne G. Lee, CE, is the present Commander and Director. Dr. Robert W. Whalin is Technical Director.

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NOTE TO READER

This report is designated as Section 8.2.7 in Chapter 8 -- EQUIPMENT, Part 8.2 -- SITE AND SEEDBED PREPARATION EQUIPMENT, of the US ARMY CORPS OF ENGINEERS WILDLIFE RESOURCES MANAGEMENT MANUAL. Each section of the manual is published as a separate Technical Report but is designed for use as a unit of the manual. For best retrieval, this report should be filed according to section number within Chapter 8.

LAND IMPRINTERS

Section 8.2.7, US ARMY CORPS OF ENGINEERS
WILDLIFE RESOURCES MANAGEMENT MANUAL

The land imprinter is a seedbed preparation tool that creates a geometric design of depressions and ridges in the soil surface. These patterns promote efficient use of rainwater for plants by (1) concentrating water, (2) providing deeper infiltration, (3) decreasing evaporation, and (4) enhancing capillary flow of soil water to plants in depressions as the soil surface dries (Dixon 1983). Land imprinters can also be used to chop brush with stems up to 6 in. in diameter. Compared with plowing, ripping, furrowing, or pitting, imprinting does a better job of maintaining the existing soil structure and keeps crushed brush mulch closer to the soil surface. Imprints last 2 years on hard dry clay and sands and longer on loamy soils (Pratt 1983).

The land imprinter has been tested and used on range improvement and reclamation projects in arid and semiarid regions of the western United States. It is most often used to rejuvenate sparse grass stands and improve vegetation establishment on disturbed sites by increasing the duration and amount of available moisture for seeds, seedlings, and established plants. Land imprinters can also be used to aid the establishment of wildlife food and cover plantings in dry regions.

DESCRIPTION

Land imprinters basically consist of 2 large drums mounted on a towing frame with angle irons welded to the drum surface (Fig. 1). The angle irons create depressions and furrows in the soil surface, and brush is crushed by the weight of the drum. The weight can be adjusted by filling the drum to different levels with water; less than 150 psi is usually required to make

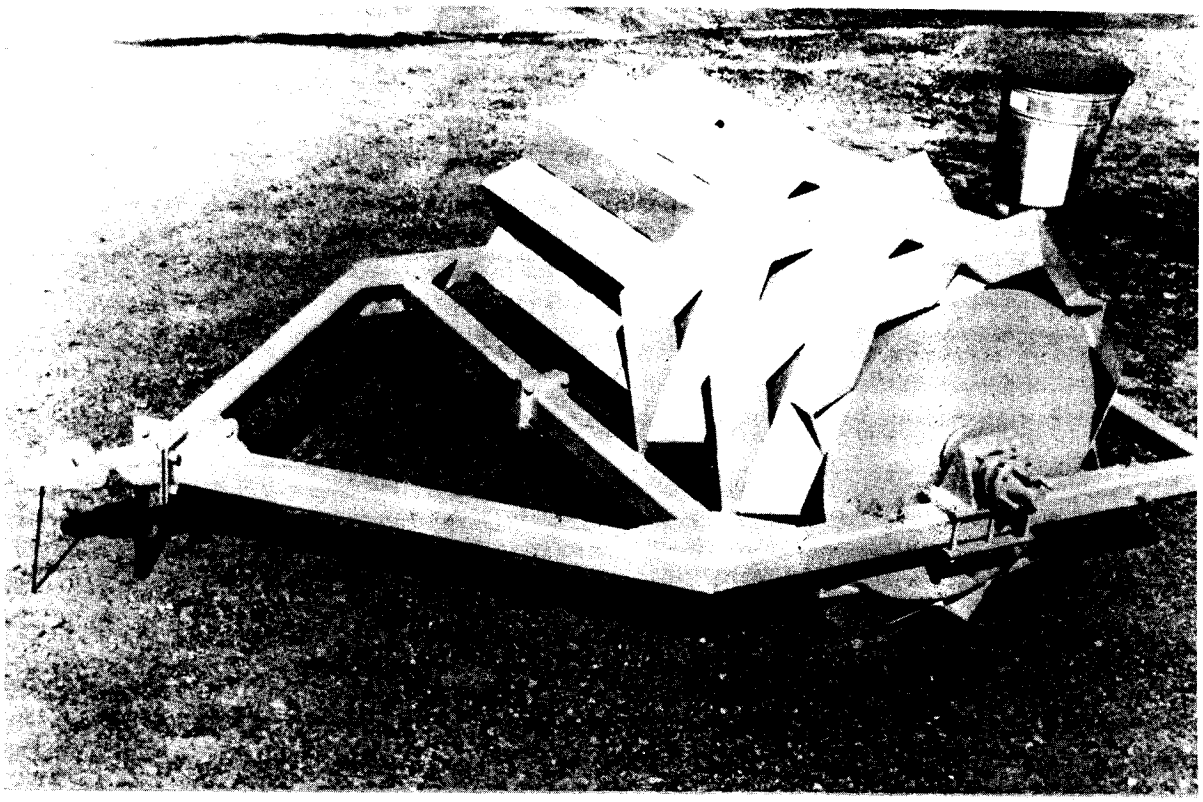

Figure 1. A land imprinter with rotary seeder attached (courtesy John Laird, Laird Welding and Manufacturing Works)

adequate impressions (Pratt 1983). General specifications for land imprinters are as follows: drum width, 3.3 ft; pattern width, 6.6 ft; drum diameter, 3.3 ft; pattern depth, 4 to 6 in.; and power requirements, 60 to 105 hp (Larson 1980).

Drums used for imprinting can be specially manufactured or built by modifying old steamroller drums. Some imprinters have removable angle irons to provide a variety of patterns, and many patterns are currently available. A rotary broadcast spreader can be mounted on the rear of the towing frame so that seeding and imprinting can be accomplished in 1 step.

OPERATION AND MAINTENANCE

The imprinter is pulled behind a 60- to 105-hp tractor or dozer (Fig. 2) and can treat over 4 acres per hour. The operation crushes and chops brush; mixes and imbeds surface debris or seed; and forms stable, complex impressions

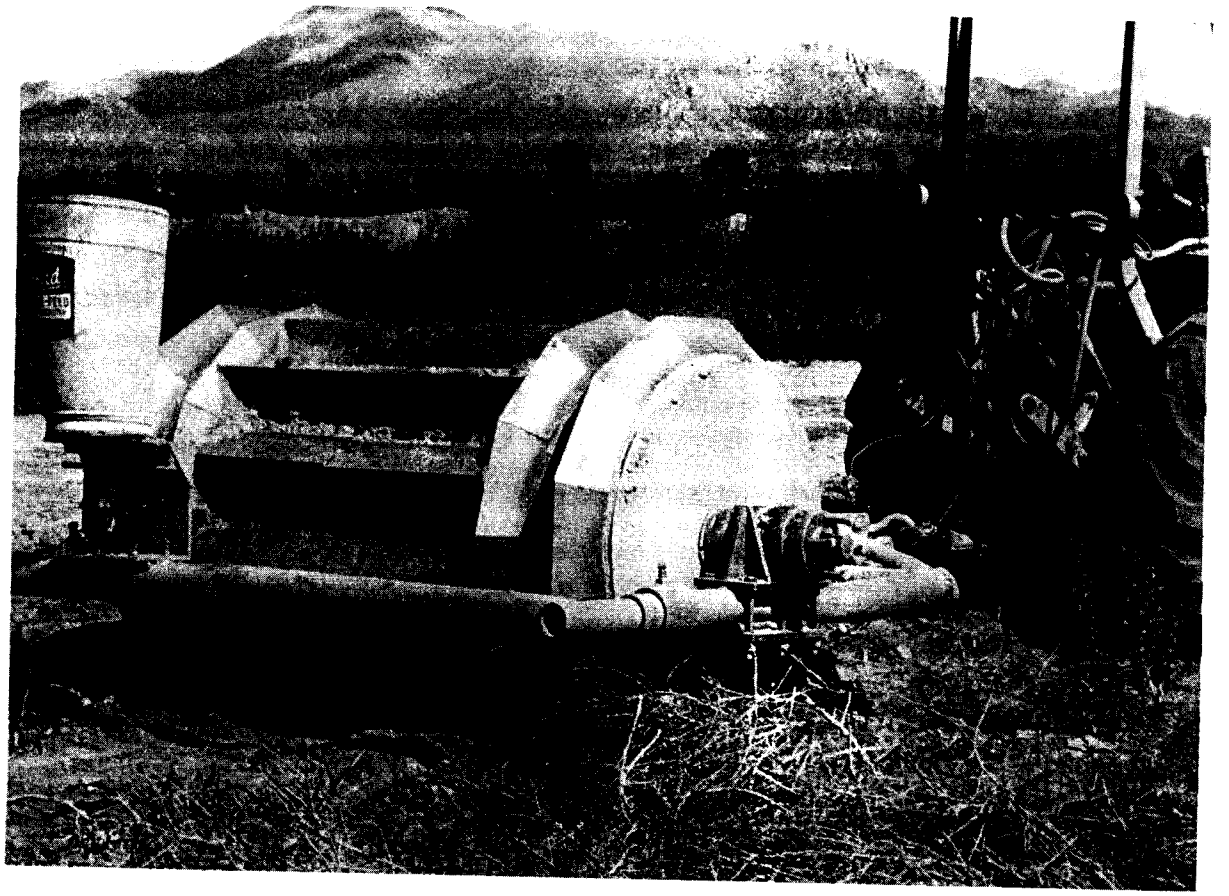

Figure 2. Land imprinter towed by a tractor (courtesy Dan W. McKenzie, USDA Forest Service)

in the soil (Larson 1980). Imprinting is most effective on loamy soils that have some moisture but are not wet enough for soil particles to stick to the angle irons. Areas may need to be ripped or chisel plowed prior to imprinting if compaction is great. Treatments should be timed with optimum seeding dates to enhance plant establishment. Drill or broadcast seeding techniques can be used before or after imprinting, or seed can be applied during operation using an attached rotary spreader.

Welds and bolts should be checked periodically and replaced when worn. Seeder attachments should be cleaned and stored after use, and water should be drained from the drums if the imprinter is not to be used for an extended period.

LIMITATIONS

The land imprinter is not adapted to shallow soils or excessively rocky sites and cannot be used to effectively treat dense stands of brush. It has some utility in sediment control (Larson 1980), but soil loss is not reduced under all situations (Clary and Johnson 1983; B. Humphries, Trapper Coal Mine, Craig, Colorado, pers. commun., 1982). The land imprinter has been used on slopes up to 45%, but pulling the device with cables is recommended on steep sites.

AVAILABILITY

The land imprinter is manufactured by:

Laird Welding and Manufacturing Works
P. O. Box 1053
531 S. Highway 59
Merced, California 95340

Further information on land imprinters is available from:

Dr. R. M. Dixon
USDA Agricultural Research Service
2000 E. Alden Rd.
Tucson, Arizona 85719

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